methods, for all have their uses and should be used alone or in combination, to suit the requirements of the individual case. There are exceptions, however, in which the radio knife can be used for resection to advantage. In cases where there is a very hemorrhagic area the mass may be quickly removed by this method, but it should be followed, in most cases, by electrocoagulation, since the action of the radio knife current is quite superficial. Indeed, if it were not it would defeat the purpose of the knife.

I think, generally, the desiccation method is better in dermatologic practice than the radio knife. Desiccation is subject to perhaps greater control. The amperage is low and the voltage high. Therefore there is less secondary inflammation. Keloids are certainly more likely to occur with a high amperage current than with a low one, and generally the cosmetic effect is superior from desiccation.

❦

George Austin Wyeth, M. D. (667 Madison Avenue, New York).—Nothing is more immediately important than the spread of definite knowledge concerning recent advances in the application of electrothermic methods to the eradication of malignant conditions.

Since high frequency currents are a highly destructive force, no one should undertake to use them in surgery or in the treatment of skin conditions who has not been properly trained in that use. This training is not difficult to secure, and the skill it gives to the surgeon is well worth the effort needed to acquire it.

The best machine for cutting is one based on radio frequency. The old spark-gap machine was experimented with by DeForest more than twenty years ago and failed to stand up. Not until the perfected radio-tubes instrument was offered did the profession have an adequate machine. I am still using my original endotherm, which is now over four years old.

Rubber gloves for the operator are not needed. There is no shock to the user of a well-made machine. Such an instrument will provide three distinct currents which are interchangeable at will: the monopolar which desiccates or dehydrates the tissues (the current which Doctor Clarke has so ably developed); the bipolar, or coagulating, which is valuable as causing a more widespread destruction than does the monopolar current; and, finally, the cutting current or endotherm knife.

Dr. Howard A. Kelly of Baltimore was one of the first to welcome the advance offered by this cutting current. Many papers read before various medical and surgical gatherings and published in our professional journals attest his praise of the new method and his success in its use. He has said: "I give this (the endotherm knife) the leading place and decided preference in my daily work, relegating the scalpel to a subordinate position."

Word also comes from London that the great surgeon, Handley, is now using the cutting current in his breast work. It is recommended on the ground of time saved during the operation; decreased danger of mechanical implantation because lymphatics are sealed off as it cuts; decreased danger from hemorrhage; soft, pliable scar following healing by first intention.

The endotherm knife properly controlled and properly used cuts fatty tissue, and the axilla can be cleaned out with it as well or better than with the scalpel. Primary healing is in direct relation to the skill used in making the incision. If the operator stops and allows the current to arc between the cut surfaces he will carbonize the tissue and prevent proper healing, for carbonized surfaces will not unite. But that is not the fault of the method; it comes from faulty technique.

The best technique in performing hemiglossectomy calls for a preliminary ligation of the vessels of the neck at time of operation and a line of coagulating necrosis drawn in healthy tissue around the malignant area. The cutting current is then switched on and the incision made through the coagulated path, obviating hemorrhage and shock.

Of the extension of electrosurgery's usefulness in removing brain tumors we have ample testimony in an article by Dr. Harvey Cushing of Boston, written for the December, 1928, number of *Surgery, Gynecology, and Obstetrics*. The new method is so rich in benefits to patient and operator it needs only to be sincerely studied and carefully employed in order to be adopted permanently.

PROTOZOAL INFESTATIONS*

A GROUP-STUDY—SOME NOTES ON STOVARSOL TREATMENT

By H. E. Butka, M. D.

Los Angeles

Discussion *by L. M. Boyers, M. D., Berkeley; R. J. Pickard, M. D., San Diego.*

During recent years numerous authors have given us a wealth of material and statistics endeavoring to prove or disprove the pathogenic rôle of the intestinal protozoa. The controversy has become quite acute.

VIEWPOINTS OF DIFFERENT OBSERVERS

On the one hand we find an author who states that "in California, at any rate, the harmless, possibly beneficial fecal scavenger is sometimes not only reviled but made a source of profit to its detractors." [1]

On the other hand many authors, including Reed, Kofoid, Kessel, Kirenen, Pickard, and Boyers are firmly convinced that most of the protozoal parasites infesting the human bowel are at times pathogenic. Quoting from these authors we find that Kirenen [2] is convinced that "experience shows that in the great majority of cases the carrier remains quite healthy and we must come to the conclusion that it is the normal function of the normal epithelium that holds the amebae in check. If, however, the normal resistance lessens (for instance, by an indigestion or by other illnesses which interfere with the function of the intestines) the amebae grow out into bigger forms, and irritation results giving the symptoms of simple colitis and dyspepsia." Reed [3] states that "it is hard to believe that any of these organisms (ciliates, flagellates, and amebae) can live and multiply in the human host without the possibility of their parasite host's balance being at times disturbed and symptoms resulting." Experience "makes me doubt if they ever infest man without increasing the health hazard of the host." Even some of the flagellates are accused of producing symptoms and Kessel [4] states that "*Penta trichomonas* have been found repeatedly in patients suffering from a diarrhea usually of a chronic type." From Thomas and Baumgartner [5] we quote: "While some men believe that *Giardia* is nonpathogenic, still of some of the worst cases of parasites (in our series), three at least, have been caused by *Giardia*." Pickard [6] believes that

* Read before the Pathology and Bacteriology Section of the California Medical Association at its Fifty-Seventh Annual Session, April 30 to May 3, 1928.

CHART 1.—*Present Survey Compared with Others*

Survey Location			Number Examined	Positive Percentage	Entameba Histolytica	Entameba Coli Group: Ent. Coli	Entameba Coli Group: Councilmania Lafleuri	Endolimax Nana	Iodameba Bütschlii	Chilomastix Mesnilii	Giardia Intestinalis	Trichomonas Hominis	Craigia Hominis	Blastocystis Hominis	Misc.
Butka	Hospital Group	Medical Students	75	50.6	10.6	4	34.6	9.3	5.3	9.3	4	1.3	1.3		
		Adults	206	17	2	1	7	1.5	.05	4	1.5	2.5			1
		Children	102	7		1				2	4	1			
Wright—U. S. Vet.			1341	58[1]	7	16.5		17.9	3.6	2.5	7	1.9		27.8	
Kaplan Williamson Geiger		Chicago	720		2.2	17.4		1.39	4.2	1.3	5.3	1.1			
Kessel Svensson	China	White	221	40	26.5	11.6	14.5	16.5	3.2	10	3	2.8			
		Native	816	60	29.5	11.7	19.2	40.1	13	6	10	4.5	0.5		
Lynch—Texas			1040	23[2]						7.5	2.3	12	0.5		3.2
Thomas Baumgartner		N. Y.	1122	44.5	1.07	17.83		17.74		21	2.4	0.26			
Kofoid et al.	Soldiers	Overseas	1200	66.5[3]	10.8	27.3		27.1		5.8	5.3	0.6		30.5	0.6
		Home Service	300	59.2[3]	3	20.4		30.7		3.3	6	2.3		33.3	1.0

[1] Includes blastocystis. [2] Flagellates only. [3] Includes metazoa and blastocystis.

"conjoint life is a test of strength between its participants. The relationship is seldom a true symbiosis, of benefit to both; practically always one party is the giver, and even when he gives from excess he must always be on guard lest his partner, flourishing, does not take from his need. . . . A change in environment changes their relative strength, so that from a benign commensalism, in which the lesser lives upon the waste of the greater, they may pass into a parasitism causing the disease or death of one of the participants. Thus a parasite ignored in its weakness may attack from strength, or from numbers, when conditions favor it." Kofoid [7] thinks that our main difficulty has arisen from attempting to carry over ideas in bacteriology and applying them to the domain of parasitology, and states: "We have been highly trained in thinking from the bacterial point of view since the days of Pasteur, and poorly trained in thinking from the point of view of protozoan infection." Pickard [6] insists that "the summary dismissal of species which are probably not pathogenic, as harmless, is not a 'scientific' attitude. . . . Any such toxic products although not reabsorbed would be a menace, so that the harmlessness of these organisms must be proved rather than their pathogenicity defended."

SYMPTOMS

The symptomatology is obscure and "when we recall the possible methods of symptom production it seems that a pathognomonic syndrome could not possibly occur."[3] . . . "The symptoms are diverse, remote, numerous, and often bizarre." "Almost any variety and degree of neurasthenia, physical depression, constipation, loss of weight, anemia, digestive troubles, vague aches, and pains, and indefinite ill health may be associated with amebiasis and disappear when the ameba is eliminated."

Discussing the so-called harmless amebae, Hall and Reed [8] state that "*Endameda coli,* with other intestinal protozoa may be potentially pathogenic," and the ways by which these parasites produce pathology are given as follows:

1. "By direct tissue damage to the mucosa.
2. "By irritation causing reflex symptoms in the gastro-intestinal tract or elsewhere.
3. "By disturbance of digestive processes resulting in intermediate or abnormal protein bodies which may be toxic.
4. "Disintegration or cytolysis releasing toxins for absorption.
5. "By possible emigrations from the intestinal tract to other portions of the body."

The symptoms usually associated with protozoal infestations are: fatigability, loss of physical alertness, constipation which may alternate with diarrhea, mucus and blood in the stools, bowel consciousness but no actual pain, flatulence, gastric disturbance, colonic tenderness, neuritic symptoms, joint symptoms, cough and expectoration, tachycardia, poor vision and iritis, hepatitis, abscesses, etc.

Boyers and Kofoid [9] declare that we are "dealing with a disease entirely as protean as syphilis and 'undramatic in behavior, subtle in onset.' The dearth of the usual findings to account for the patient's symptoms should make one suspicious of an amebic infection, especially if the symptoms are vague in character."

REPORTS OF OTHER WORKERS

Referring briefly to Chart 1 we note in a number of surveys made in various portions of the United States and in other countries that the percentage

CHART 2.—*Protozoal Infection Survey of 75 Medical Students*

PARASITE	ASSOCIATION—OTHER PARASITES			Total No. Infected	% of Infected Group	% of Total No. Examined
	Single	Double	Triple			
Entameba histolytica	2	5	1	8.0	21.0	10.6
Entameba coli	1	2	0	3.0	7.9	4.0
Councilmania lafleuri No. 1	7	8	3	18.0	47.3	24.0
Councilmania lafleuri No. 2	3	3	2	8.0	21.0	10.6
Endolimax nana	3	1	3	7.0	18.4	9.3
Iodameba bütschlii	1	3	0	4.0	10.5	5.3
Chilomastix mesnilii	4	3	0	7.0	18.4	9.3
Giardia intestinalis	1	1	1	3.0	7.9	4.0
Trichomonas hominis	1	0	0	1.0	2.6	1.3
Craigia	1	0	0	1.0	2.6	1.3
Total	25	24	10	59.0		

Total number of students infected—38 Percentage infected—50.6%

of the population infested with one or more of the protozoan parasites is extremely high. Wright in examining a group of veterans found only 42 per cent free from protozoan parasites, but from his charts we must conclude that the *Blastocystis hominis* was included in the infested group. Kessel and Svensson in China found 40 per cent of the white and 60 per cent of the native population harboring parasites. Lynch in a survey made in Texas found 23 per cent infested with the protozoan flagellates.

MEDICAL STUDENT GROUP

The present study was begun during the spring of 1927 and covered a single class of medical students, then in their Junior year, and the technicians who assisted in conducting the course in laboratory diagnosis. During the course on stool analysis, each student was required to furnish sample specimens and, following the class period, these were reëxamined in my laboratory. The writer made a careful search of the specimens suspected of harboring parasites by the iodin-eosin method, followed by the iron-hematoxylin stain. To his surprise thirty-eight students, out of a group of seventy-five examined, were found to harbor one or more parasites each, or a per cent of 50.6 on a single examination.

HOSPITAL GROUP

A second study was made of the hospital patients having stool examinations during the past two years. Here our results were only 13.6 per cent positive, even with multiple stool examinations. It is surprising to find so marked a difference in the two groups. These findings were discussed in my previous paper and would indicate that preparation for hospitalization included certain procedures which materially decreased the number of parasites present in the stools at least temporarily.

PARASITES FOUND

Referring to Chart 2 we find an analysis of the type of parasites found, the number presenting single, double, or triple infections, and the percentage as compared to the number of positives and the total number of persons examined.

Comparing these findings with the results of other workers a similarity in the percentage infested with the various parasites is noted, although the number of those harboring the *Entameba histolytica* is higher than in most surveys in the United States.

The medical students who were examined belonged to the first class of students entering the medical school on the "coöperative basis." This plan provides for practical training in various hospitals and laboratories for a period of time equal to the time spent in school work. The close contact with sick patients may have increased the number of protozoal infections. However, a single stool specimen only was examined. James, Kofoid, and others estimate the number of positives obtained on a single examination as ranging

CHART 2-A.—*Protozoal Infection Survey of Hospital Patients*

Parasites	Association with Other Parasites			Total No. Infected	% of Total No. Examined
	Single	Double	Triple		
Entameba histolytica	0	3	1	4	1.4
Entameba coli	1	2	0	3	1.0
Councilmania lafleuri	8	5	2	15	5.0
Iodameba	0	0	1	1	0.6
Endolimax nana	1	1	1	3	1.0
Chilomastix mesnilii	4	5	1	10	3.3
Giardia	6	1	0	7	2.3
Trichomonas hominis	6	0	0	6	2.0
Miscellaneous	3	0	0	3	1.0
Total	29	17	6	52	

Total Number Examined.....308
Number Infected 42
Percentage of Infected..... 13.6

CHART 3.—*Influence of Residence*

Location	Infected Group	Parasite-Free Group
Tropics	10	8
U. S.: West	6	8
South	4	4
Central	13	13
East	5	4

from 40 to a maximum of 75 per cent, depending on the skill of the worker and the time available. Estimates on this basis would indicate that at least 70 per cent of this group harbored parasites.

EFFECT OF RESIDENCE

Chart 3 is an analysis of the entire group of students to determine, if possible, whether place of residence would account for the large number of persons affected. There is, however, little difference as to residence in the infested and non-infested groups. A few more students are found in the infested group with a history of foreign residence.

SYMPTOMS PRODUCED

Upon obtaining the consent of the infested group for experimentation, I first attempted to determine the extent of symptoms. The results are listed in Chart 4. Of this group only six, or 18 per cent, stated that they were free from symptoms. Sixty-six per cent suffered from abdominal discomfort, while 27 per cent had actual tenderness along the course of the colon. Fifteen per cent suffered from diarrhea, while 48 per cent reported constipation.

EFFECT OF STOVARSOL

Following this preliminary survey it was determined to study the value of some of the anti-protozoal remedies. Perusal of many recent articles led me to use stovarsol in an attempt to determine its real value. The entire group of students was placed on a treatment consisting of the administration of stovarsol alone. The dosage prescribed was one-fourth gram tablet three times daily for twelve days, making a total of nine grams of this preparation.

CHART 4.—*Symptoms Found in Infected Group*

NUMBER REPORTED: 33	
Diarrhea	5
Constipation	16
Mucus in stool	3
Blood in stool	1
Gaseous distention	23
Abdominal discomfort	22
Colonic tenderness	9
Arthritis	2
Neuritis	5
Skin—acne, etc.	9
Eye conditions	9
Miscellaneous symptoms	15
No symptoms	6

CHART 5.—*Effects of Stovarsol Medication*

Dosage: 36 tablets, ¼ gram each; 3 tablets daily for 12 days. Immediate effects of medication as follows:

NUMBER TAKING TREATMENT: 30		
		Per-c'tage
Severe headache	7	23.3
Malaise	21	70.0
Diarrhea and colonic tenderness	18	60.0
Loss of appetite	10	33.3
Marked loss of weight	3	10.0
Temperature above 100° F.	8	26.6
Rash (resembling measles)	2	6.6
Confined to bed	4	13.3
Number with toxic symptoms sufficiently annoying to prevent completion of course of medication	14	46.6

The effects of the stovarsol treatments are outlined in Chart 5, which is an analysis of the thirty students reporting, following the administration of the drug.

It is interesting to note that of the thirty students taking the course of treatment, fourteen, or 46.6 per cent, suffered with sufficiently annoying symptoms to make it advisable to discontinue the course as prescribed. Eight students, or 26.6 per cent, developed a temperature above 100 degrees Fahrenheit, and two suffered with a toxic rash. Four were confined to their beds for short periods of time, while eighteen, or 60 per cent, suffered from diarrhea during the course of the treatment. These results are sufficient proof to indicate that stovarsol is a powerful drug and must be used with caution.

The reports of other workers would indicate a variable toxicity, one report recording three cases of toxic erythema out of a total of eight patients treated with a French preparation, while another report of a larger series states that about 6 per cent of patients receiving stovarsol for seven days developed a toxic rash. In my series this percentage was 6.6

Having determined what precautions were necessary in the use of this powerful drug, a stool specimen for study was requested about two weeks following the completion of treatment. Only thirteen specimens were returned at this time. One only was found to be positive, and in this instance treatment was discontinued before the completion of the course. The examination at this time indicates definitely that stovarsol is

CHART 6.—*Stool Examinations Two Weeks Following Stovarsol Administration*

Number Examined	13
Positive	1=7.6%

CHART 7.—*Symptoms Following Treatment*

NUMBER REPORTING FOLLOWING TREATMENT: 28

		Per-c'tage
No Symptoms	10	35.7
Improved	8	28.5
Total Improved	18	64.2
No change	9	32.1
Worse	1	3.5
Total Unimproved	10	35.6

sufficiently powerful to clear the intestinal tract of active amebae within a short period of time.

SYMPTOMATIC IMPROVEMENT

Answers to a questionnaire as to the change in symptoms following the course of treatment were next obtained. Of the twenty-eight reports obtained at this time, ten, or 35.7 per cent, gave no symptoms; another group of eight, or 28.5 per cent, reported marked improvement, making a total of 64.2 per cent of the students showing definite improvement following the course of treatment. Nine students, or 32 per cent, reported no change; while only one student reported that his condition was definitely worse, making a total of 35.6 per cent unaffected by the medication.

RESULTS OF REËXAMINATIONS FOLLOWING TREATMENT

Final stool examinations were made from two to eight months following the completion of the course of stovarsol. Of the fifteen students completing a full course of treatment, two were found to harbor parasites, making a percentage of failure of 13.3. Of the fourteen students discontinuing treatment before the completion of the twelve days' medication, seven were found to harbor parasites, making a percentage of failure in this group of 50 per cent.

Chart 8 presents a list of the parasites resisting treatment. Representatives of all of the groups of protozoan parasites are found, so that no conclusion can be drawn as to specificity of the stovarsol for individual members of the group.

CHART 8.—*Results of Stool Examination Made Two to Eight Months Following Stovarsol*

TOTAL NUMBER SENDING SPECIMENS FOLLOWING MEDICATION: 29

Positives ..... 9 = 30.6%
Full course ..... 2 = 6.8%
Partial course ..... 7 = 23.8%

Analysis of Positives

(a) Number taking full course 15
Number of failures ..... 2=13.3%
Parasites Resisting Treatment—
1st case ..... C. laf. No. 1
Chilomastix mes.
2nd case ..... E. hist.

(b) Number taking partial course 14
Number of failures ..... 7=50%
Parasites Resisting Treatment—
1st ..... Chilomastix mes.
2nd ..... E. nana
3rd ..... Iodameba büts.
4th ..... C. lafleuri
E. craigia
5th ..... E. nana
6th ..... E. histolytica
7th ..... C. lafleuri

Number of cases showing parasites following medication, in which a lessened number of types were found 5

SUMMARY

Considering the whole group, the results are quite encouraging in the temporary eradication of the parasites, and a fairly permanent removal in 69 per cent of those treated. Comparing these results with the reports of other workers, we find Silverman reports 77 per cent cures from a group of forty-six cases. Brown reports sixty-three cases of stovarsol administration with six known recurrences. Willmore and Martindale report thirty-seven cures out of a total of forty cases treated by a combined method in which stovarsol was prominent, but further states[10] that this is "a figure which later experience may show to be far too optimistic."

Reviewing briefly the results of my experience with stovarsol I believe, with Johns,[11] that "we possess in this synthetic arsenical compound a truly specific amebicidal drug. The astonishing rapidity with which both vegetative and encysted amebae disappear from the stools, coincident with the complete relief of dysenteric symptoms, is unparalleled in my experience by any other specific therapeutic drug."

While I realize that this study is not conclusive, progress can only be made by continued study of the parasites, with comparisons between the findings of the various workers. In this instance the coöperation of a group of highly trained men while completing their third and fourth years in medicine has seemed to me to be of sufficient value to add my findings and conclusions to the already voluminous literature on the subject.

CONCLUSIONS

In conclusion I wish to reiterate:

1. That a high percentage of individuals are harboring one or more varieties of the intestinal protozoan parasites.

2. Approximately 10 per cent of our series harbored the *Entameba histolytica,* a parasite that is known to produce serious pathologic changes not only in the intestinal tract, but also in the liver,

eyes, skin, gall bladder, and other organs of the body.

3. Many parasitologists now believe that each of the intestinal amebae may produce symptoms under favorable circumstances.

4. The protozoan flagellates may also be productive of obscure symptoms.

5. Stovarsol is apparently a specific for the intestinal amebae.

6. Stovarsol is a powerful drug, and untoward symptoms are frequent if the dosage is continued for a period of more than seven days.

7. A toxic erythema, resembling measles, occurs in at least 6 per cent of all cases treated by stovarsol.

8. Satisfactory results were obtained in the series of cases treated by stovarsol alone, in approximately 70 per cent.

9. A mixed treatment combining the effects of stovarsol with emetin, yatren, bismuth-emetin-iodid, and other well-known remedies for the protozoan parasites will probably give us a higher percentage of satisfactory results.

10. If these conclusions are warranted it seems possible that protozoal infestations must occur not infrequently on the debit side of some of our accounts.

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REFERENCES

1. Wight, Toynbee: Routine Stool Examinations for Protozoa at a United States Veterans' Hospital, U. S. Vet. Bureau Med. Bull., June, 1926, Vol. 2, No. 6, pp. 557-567.

2. Kirenen, W. W. A.: On Amoebiasis, Leiden, Holland International Clinic, September, 1926, Vol. 4, pp. 70-75.

3. Reed, Alfred C.: Intestinal Protozoa in General Practice, Calif. and West. Med., January, 1926, Vol. 24, No. 1, pp. 50-53.

4. Kessel, John F.: Distinguishing Characteristics of the Intestinal Protozoa of Man, China Med. Jour., February, 1925, Vol. 39, No. 2, pp. 85-120.

5. Thomas, Walter S., and Baumgartner, E. A.: Stool Examination for Protozoa, Jour. A. M. A., November 28, 1925, Vol. 85, No. 22, pp. 1725-27.

6. Pickard, Rawson J.: The Pathogenicity of the Small Races of the "Ameba of Dysentery, J. Lab. and Clin. Med., May, 1927, Vol. 12, No. 8, pp. 742-55.

7. Kofoid and Swezy: Councilmania Lafleuri, A Parasitic Ameba of the Human Intestine, Pub. Dept. of Zoölogy, June 23, 1921, xx, 169-98.

8. Hall, James H., and Reed, A. C.: Entameba Coli, Jour. A. M. A., June 20, 1925.

9. Boyers, Luther M., Kofoid, Charles A., and Swezy, Olive: Chronic Human Amebiasis, J. A. M. A., November 7, 1925, Vol. 85, No. 10, pp. 1141-47.

10. Willmore, J. G., and Martindale, W. H.: Treatment of Amebic Dysentery by Auremetin, Brit. Med. Jour., March 20, 1926, pp. 5257.

11. Johns, Foster M.: Treatment of Chronic Amebic Dysentery with Stovarsol, Med. Clin. of N. A., January, 1926, pp. 1089-91.

DISCUSSION

L. M. Boyers, M. D. (First National Bank Building, Berkeley).—In discussing Dr. H. E. Butka's article on protozoan infestations and the effects of stovarsol on them, one can with most profit confine himself to his own experience and study. Before proceeding with a discussion of stovarsol one would like to suggest the inadequacy of the iodin-eosin method of stain as a primary check on infections. Out of our experience in association with Professor C. A. Kofoid of the University of California, it is our suggestion that the iodin-eosin method be abandoned and that all examinations be made on iron-hematoxylin stained smears.

In commenting on Chart 2 the conclusion is drawn that preparation for hospitalization includes certain procedures which decrease the number of parasites present in the stools at least temporarily. In this connection, early in our work in Berkeley it became apparent that one could profit by past medical experience in the practical handling of syphilis. It seemed necessary to adopt the same attitude, *i. e.*, to make a definite clinical diagnosis against which one can and should check laboratory findings. If this is done it is possible that the findings depicted on Chart 2 may have a different interpretation, and that instead of representing obscuration due to the preparation for hospitalization, they may merely indicate the desirability of a twofold approach—one, a thorough-going study of the history and symptomatology, sigmoidoscopy, duodenal drainage, gastric meal and x-ray gastro-intestinal examination, and, two, a laboratory fecal examination and diagnosis.

The comments on stovarsol interest me a great deal for two reasons at least: first, because they bring to light the vicious toxicity of the drug, and, second, because they hint at what we may confirm as the inadequacy of the drug as a thorough-going amebicide. Our experience with stovarsol goes back a number of years. We began its use with the French product about two years before the drug came on the American market. Since that time our experience with it has been almost continuous. Here let me refer to a late editorial in the *Journal of the American Medical Association*, Vol. 91, No. 11, September 15, 1928, p. 805, entitled "The Distribution of Arsenicals in the Body," in which attention is directly called to the variations in distribution of the drug in the tissues which occur upon the use of trivalent and pentavalent arsenicals. Stovarsol, being a pentavalent arsenical, can be expected to produce pigmentation, keratoses, dermatitis, wrist-drop, and optic atrophy. Curiously, our own experience is at variance with this editorial comment, since in our experience intolerance for and poisoning from stovarsol has almost uniformly caused symptoms more nearly approaching those attributed to the trivalent compounds, *i. e.*, severe dermatitis, injection of the mucous membranes and the eyes, and generalized aching with intense headache. This editorial is concerned chiefly with a recent article by E. D. Osborn, M. D., appearing in the *Archives of Dermatology and Syphilology*, Vol. 18, No. 1, July, 1928, entitled "Microchemical Studies of Arsenic in Arsenical Dermatitis," and a preceding article entitled "Microchemical Studies of Arsenic in Arsenical Pigmentation and Keratoses." These studies represent a more analytical and exact approach and a more rational foundation for future therapy in so protean an infection as chronic human endamebiasis. In this connection, since we are primarily discussing arsenicals, let me call attention to the volume published by Raiziss and Gavron, entitled "Organic Arsenical Compounds," which is a very concise and succinct reference book for medical men who are interested in this element and its compounds.

Returning once more to Doctor Butka's article, it would be easy to reënforce his comments on the toxicity of stovarsol, based on our own experience with stovarsol extending over several years. One classic example may serve to illustrate the case. A young Armenian woman came under my observation and care suffering from indigestion with a frank chronic human entamebiasis due to *Entameba dysenteriae*. She was treated for the time being solely with stovarsol, and given 0.25 gram in enteric capsule t. i. d. p. c. until she had taken seventeen tablets. This dose was determined upon because she had a

body weight of not less than 150 pounds, because she showed no signs of kidney disturbance prior to treatment, and because definite signs of chronic hepatitis precluded the use of treparsol, in our opinion. Upon completion of the seventeenth dose this young woman became ill with a severe febrile attack accompanied by exfoliative dermatitis and albuminuria. She was confined to bed for several days. I wish to mention the size of her dosage and the vigor of her intolerance principally because within a few weeks after this attack she was found to harbor *Entameba dysenteriae* as luxuriantly as ever.

Another case at this time, a woman of fifty, weighing over 150 pounds, with evident liver damage, on a dose of 0.25 gram once daily, developed fever, albuminuria and exfoliative dermatitis at the end of the fifth day, *i. e.*, after a total dosage of only 1.25 grams of stovarsol.

Many cases of this sort occurring with and after both small and large doses of stovarsol have determined two conclusions in our minds: first, stovarsol is a highly toxic drug, not sufficiently and specifically poisonous enough for *Entameba dysenteriae*, and at the same time too poisonous for most human hosts. It is a useful drug to have in one's armamentarium if one is dealing with much chronic entamebiasis. It is debatable whether it should be on the open market, readily available for use by the inexperienced, where it is apt to be given without adequate check, such as oft-repeated urinary examination and cognizance of liver disease, and where metallic poisoning may occur unobserved.

In conclusion I wish to say that as early as eight years ago it became apparent in our work that the treatment of chronic human entamebiasis must include the application of two principles so old and trite that it is embarrassing to name them. One is the strict individualization of each case, with a definite and incisive determination of the kind and degree of tissue damage sustained in each particular case; and with this varying systemic damage in mind, the institution of a definite individualized course of treatment which will take into account the tissue peculiarities of the patient and will draw upon the whole therapeutic armamentarium for its effectiveness. We like to state these principles more briefly by saying that there is no one cure and no one treatment for infection with *Entameba dysenteriae*. At best there must be a campaign suited to the individual case. One must for therapeutic purposes draw upon the whole armamentarium which must of necessity include ipecac and its derivatives, numerous arsenicals (and not stovarsol alone), bismuth preparations of various types, quinin, yatren and iodin, kaolin, charcoal, many of the endocrine products, calcium salts, hematinics, autogenous vaccines, various types of physiotherapy, low residue protective dietaries, antispasmodics, peptone solution, and other remedies.

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R. J. Pickard, M. D. (Watts Building, San Diego). Continued experience is convincing me that nearly all carriers of intestinal protozoa, at times, and many carriers most of the time, give symptomatic evidence of their infestation. These symptoms fall into three groups: one, those referable to the alimentary tract; two, remote (toxic ?) effects on the nerves and joints; and, three, yet more remote, the physical and mental lassitude and depression.

Doctor Butka's paper is a valuable contribution of exact observation and rechecking over a long period in a group of cases in which especial interest is furnished by the statistics on the medical students. He shows the difficulty in handling these patients who are discomforted rather than ill, even when selected from a class intelligent enough to coöperate with their physician.

Doctor Butka also shows the penalty of overdosage with stovarsol, so easy to give that one is apt to forget that it is arsphenamin, oxidized, and should be administered with equal caution. Emetin, too, should be given at longer intervals than is customary, because of its effect upon the heart muscle and nerve tissue, and its slow and irregular elimination. Ravaut, to avoid these difficulties, and to prevent the building up of drug resistance by the parasite, alternates both active drugs as described in detail in "Syphilis, Paludisme Amibiase," with a bismuth-ipecac paste in the intervals. When giving intravenous treatment he does not exceed 0.30 novarsenobenzol every four days since "dysenteric patients," because of their debility, and more because of the alteration of their digestive tract and liver, cannot take arsenic as well as other patients, especially when the disease is chronic. Overdosage with stovarsol or treatment with emetin-bismuth-iodid may readily appear to the patient as worse than the original complaint. Yet laboratory experience shows that stovarsol alone, in most cases, in small-spaced dosage, over a period of a few months is almost a specific for both the amebic and flagellate infections.

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Doctor Butka (closing).—There is still considerable difference of opinion as to the adequacy of various methods of search for the protozoal parasites, but this paper demonstrates the effectiveness of the ordinary methods of search in the hands of an experienced worker.

In the eradication of the parasites it has frequently been proven that any single remedy will not be effective in all cases. Some parasites will survive the stovarsol medication and succumb to ipecac and its derivatives, while others are ipecac resistant. While failures following stovarsol medication are observed, there can be no question as to the presence of a specific effect on these parasites. The fact remains, however, as stated by Doctors Boyers and Pickard, that caution must be used in the use of stovarsol, and there must be individualization in the treatment of the intestinal protozoa.

RADIATION TREATMENT OF CERTAIN KIDNEY DISORDERS*

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THE following singular incident which occurred in the summer of 1901 called my attention to the possible value of radiation therapy in kidney disease. At that time Dr. John B. Murphy visited California in the company of a distinguished medical friend from the Middle West. The friend, en route, developed an acute renal colic accompanied by the passage of blood mixed with considerable purulent material, associated with frequent and painful micturition. Doctor Murphy, who suspected the presence of stone, brought his friend to our office for a diagnosis by means of the x-ray.

The best x-ray equipment in the city in those days consisted of the old type glass-plate static machine with all its ancient trimmings, including a vacuum tube of queer shape and uncertain habits. My recollection of this x-ray diagnostic attempt is not altogether accurate, but it is certain

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